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ABSTRACT

This paper presents some of the findings of the Illinois Valedictorian Project, a longitudinal study of 81 top high school students just completing its 10th year. In particular the effects of gender, race, academic talent, and the relationship of undergraduate experiences to early adult achievement and tacit knowledge were examined. Data was collected through five to six semi-structured interviews and periodic questionnaires. The first 5 years revealed gender differences in intellectual self-esteem and career aspirations with females lowering their estimate of their intelligence over their college years. Women also showed concern about combining career and family and planned to interrupt their future labor force participation for child rearing. At the 10 year mark gender differences were evident with women either out of the labor force due to child rearing or generally employed in female dominated fields while men were in business and technical fields. Three individual case studies are included: two women and one African American male. These studies highlight the research findings indicating that women and minority valedictorians lacked tacit knowledge about how to build careers and were constrained in career development by lack of support and role models. Included are 10 references. (JB)

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Gender, Race, and Academic Talent: The Postsecondary Experiences of High School Valedictorians

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Note: The research reported in this paper was conducted collaboratively with Terry Denny, Professor Emeritus, University of Illinois at Urbana-Champaign. This paper is a draft, subject to revision and is not for quotation or publication in any form without the written permission of the author.

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> One thing that intrigued me at my high school was that such an incredibly disproportionate number of the top students were women at that age and yet the further I go along, at each stage, there seems to be fewer and fewer women. I've never understood why that should be and I've never understood where all those women went that were in classes with me in high school.

These words come from an interview with a male attorney ten years after his graduation as high school valedictorian. The former valedictorian Len, (a pseudonym), spoke in response to the general question: "what would you be interested in knowing about what happens to high school valedictorians?" The Illinois Valedictorian Project has just completed the tenth year of a longitudinal study of 81 top high school achievers. The valedictorian study follows the academic and nonacademic lives of the "best" seniors from Illinois high schools in the graduating class of 1981. The Project attempts to illuminate academic success-- its foundations, its costs, its rewards, and its relationship to career and personal life patterns.

The first decade of the valedictorian study has revealed an indirect relationship between academic attainment and early adult career achievement. Without knowing the findings of the ten-year valedictorian study, Len identified the central theme of the young adult lives of academically talented students. The realization of early promise is far more difficult and complex for academically talented women and minorities than for white male former valedictorians. As Len accurately observed, fewer and fewer young women continue to be present in increasingly higher levels of prestigious careers. Similar patterns characterize Black and Hispanic academic achievers. The tale of what happens to high school valedictorians in the decade following high school graduation is primarily a story of gender and race. Attrition of academically gifted women and minorities from high level achievement settings and their lowering of intellectual self-esteem begins as early as sophomore year in college and continues through college, graduate school, and even post-doctoral work. By 1991, some women were among the highest achievers in the study but, as a group, women and minority valedictorians were achieving at lower levels than the white male study group. Len was unsure what caused the pattern of lowered achievement by women. Possible relationships between adult career achievement, academic achievement, and gender and race emerge through the findings of the Illinois Valedictorian Project. The conditions under which high achievement is sustained become more apparent in relating the undergraduate experiences to early careers levels of gifted students. Longitudinal study of a broad range of academic and non-academic qualities and experiences also allows investigation into the adult achievement factors that interact with ability.

The ten year longitudinal data base of interview and survey material forms the basis for the current investigation of the undergraduate experiences that affect post-graduate achievement for academically talented women and minorities. Following an overview of the methodology of the Illinois Valedictorian Project and a summary of the major findings from the first ten years, representative case studies will be analyzed in order to explore the relationship of undergraduate experiences to early adult achievement and tacit knowledge.

Background of the Illinois Valedictorian Project

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This paper was presented at the annual meeting of the Association for the Study of Higher Education held at the Park Plaza Hotel & Towers in Boston, Massachusetts, October 31-November 3, 1991. This paper was reviewed by ASHE and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC collection of ASHE conference papers.

The common achievement setting of childhood and adolescence is formal schooling and the measurement of school achievement is grades. The top student in a high school is most often identified as the student with the best grades, and the longstanding practice of naming a valedictorian as the highest ranked student acknowledges the importance schools attach to grades. Surprisingly, no systematic study of high school valedictorians appears in the social sciences literature. Countless anecdotes and yearly newspaper profiles comprise most of what is known about valedictorians. Studies in the gifted literature, such as Terman's studies of genius (Terman, 1959) or Project Talent (Flanagan & Cooley, 1965), include a few valedictorians. Commonly, however, researchers of the gifted identify talented individuals on tested measures of ability and creativity or on eminent or creative performance. And even gifted individuals identified on the basis of ability and creativity are rarely studied longitudinally to determine their achievement paths.

Outside of research and theory on the gifted, a small body of empirical research investigates the relationship between grades and such adult attainments as employment level and income (Baird, 1985; Cohen, 1984; Pascarella & Smart, 1990). This literature finds a small, positive relationship between academic success and adult career measures. Academic performance explains very little of the variation in adult career outcomes, however, and grades appear to influence career attainment only indirectly. Cross-sectional, quantitative analyses of grades and adult outcomes fail to illuminate the conditions under which high grade earners sustain their achievement or the attributes that might affect both scholastic and non-academic performance. Of particular difficulty in this literature is the problem of separating individual characteristics, such as motivation and ability, from the increased access to opportunities that results from high academic performance.

The Illinois Valedictorian Project echoes other research in the finding of an indirect effect of grades on adult career patterns. The theoretical conception of practical knowledge offers one possible explanation for the wide variation of adult outcomes among highly talented students and provides a theoretical framework for the current study on gifted women and minority students. In his Triarchic Theory of Intelligence, Robert Sternberg and his colleagues identify "tacit knowledge" as an important component of practical intelligence (Sternberg, 1985; Sternberg & Wagner, 1986). Sternberg defines tacit knowledge as career-related understanding that is rarely verbalized and not explicitly taught. Like practical intelligence in general, tacit knowledge is necessary to function highly in achievement tasks. Knowing how to build a career, for example, is a form of tacit knowledge that is independent from academic ability but is necessary in order to capitalize on scholastic talent. Practical career building knowledge is largely absent from the formal secondary and undergraduate curricula. Little research has been conducted on practical knowledge, compared to the other major factors of Sternberg's triarchic theory. Studies have found, however, that tacit knowledge relates to career success in academic psychologists and to job level among business managers (Wagner & Sternberg, 1985).

Sample and Method

The Illinois Valedictorian Project began in 1981 with the identification of 82 high school valedictorians and salutatorians throughout the state of Illinois. (The students will be referred to as 'valedictorians' for the sake of conciseness.) All Illinois high schools were contacted to ask if they recognized a valedictorian and, if so, if the valedictorian delivered the traditional commencement address. Of the 500, (approximately half), of the state high schools that replied, schools were sampled in order to provide the widest possible diversity of school and community types. Care was taken to include public and private high schools that were geographically dispersed through the state of Illinois. Suburban, urban, and rural schools were included as well as schools with predominantly minority student bodies. (One valedictory speech was delivered in Spanish.) The sample was also shaped by the schedule of the school commencement exercises; a Project researcher attended each graduation to witness the ceremony and the valedictory address.

Shortly after the high school commencements, students were contacted to ask them to participate in a ten year study. Of the 90 students contacted, only one student refused to join the study and seven never responded to repeated messages. A final student joined the study but was killed in an automobile accident in her sophomore year of college. The remaining 81 students all remain active in the study ten years after high school.

The members of the Illinois Valedictorian Project are 46 women and 35 men who earned the best grades in their Illinois high school classes. Most of the students are white; five are African-American, three Mexican-American, and one Asian-American. Study members were the best grade earners in large classes in prestigious Chicago suburban high schools, in small farming community schools, and in inner city high schools with high drop out rates. They attended private co-educational and single-sex Catholic and Lutheran schools as well as private non-denominational high schools. Study members' parents worked as unskilled laborers, trade and small business workers, and professionals. Their parents were educated to the sixth grade in some instance, beyond the Ph.D. in others. As a group, the valedictorians were more likely than their age peers to come from two-parent homes, and were less likely to have used alcohol and other drugs before high school graduation than the national cohort of high school seniors. (Comparisons are based on replication of a survey of a national representative sample of high school seniors from the class of 1981 (Johnston, Bachman, & O'Malley, 1981)). Study members were very similar to their classmates in terms of their political beliefs and values, however, viewing higher education primarily as preparation for well paying jobs. About a third of the valedictorian group saw religion as central to their lives; several were fundamentalist Christians. As a group, the valedictorians did not see themselves as the brightest students in their school, nor as primarily intellectuals. Well rounded and involved in school activities, most of the valedictorians attributed their academic success to hard work, persistence, and motivation.

The valedictorians have participated in five to six semi-structured interviews of one to two hours. In addition to the interviews, questionnaire data were collected in 1981, 1984, 1985, and 1988. Interviews were conducted each of the first four years of the study, when most of the students were in college. The first interview centered on family background, high school experiences, and adjustment to college. Subsequent college interviews explored academic experiences and decisions, emotional ups and downs, relationships, and career planning. Interviews since college have focused on graduate school, careers, and relationships. All of the students were interviewed in the tenth year of the study, 1990-91.

Undergraduate years

All of the valedictorians began college in the fall term after their May 1981 high school graduation. The group scattered around the country at public and private institutions of widely varying prestige. Most (70%) graduated in four years. Ninety-three percent of the group earned the bachelors degree in the first ten years after high school. The six students who have not completed undergraduate degrees left school for personal, rather than academic reasons. One of the six is still actively pursuing his bachelors degree.

The valedictorians clustered in a few academic majors: business (24%), engineering (19%), and science (19%). Other study members majored in a variety of other fields, including humanities, fine arts, nursing/physical therapy, and social sciences. No valedictorian began college intending to be a teacher, although two women eventually switched their majors to science education. Two males majored in vocational education; neither has worked in the schools. The valedictorians generally remained in their initial colleges and academic majors; only three study members transferred to other institutions and six women and three men changed their majors during college.

The stability of college and major choices in the study group doubtless results from the predominance of vocationally specific academic programs they entered as freshmen and, more importantly, from the continued academic attainment of the valedictorians. The study group excelled academically in their undergraduate years, earning a mean grade point average of 3.6 on a four point scale. As college students, the former high school valedictorians continued to earn scholastic honors. At least a dozen study members graduated Phi Beta Kappa and three were named the outstanding student of their graduating class. Six former valedictorians earned all A's in college. Three of four study members received one or more academic honors as undergraduates.

The story of the first five years beyond high school was one of gender differences in intellectual self-esteem and career aspirations for the valedictorians. Early findings have been covered more fully in previous study reports (Arnold and Denny, 1985; Arnold, 1987). The first major gender difference emerged in the area of intellectual self-esteem. Although men and women participants received equally high college entrance examination scores and college grade point averages, women lowered their estimate of their intelligence over their college years. The first drop in self-estimated intelligence in relation to peers occurred between senior year of high school and sophomore year of college. The women, but not the study men, showed a sharp decline in their own estimations of their intelligence. By senior year of college, some women had raised their self-ratings. A significant difference remained, however, favoring males' intellectual self-estimate. Moreover, no woman said she was far above average in intelligence compared to her peers, while a quarter of the men said they were far above average.

A second gender difference was the persistent theme of women's concern about combining career and family. As college sophomores, six of the valedictorian women abandoned their medical school aspirations, citing concern with the interference of professional demands on future marriage and childraising. Women in all majors raised concerns about the merging of family and career, although none were married or engaged at the time. Male study members did not raise these issues in anticipating their own educational and professional paths.

A third gender difference was the striking divergence in labor force participation plans of male and female valedictorians. By their senior year of college, two-thirds of the women valedictorians planned to reduce or interrupt their future labor force participation to

accommodate childraising. All of the men planned continuous, full-time labor force participation.

Finally, women's professional expectations as college seniors were more vague than those of the men in the study group. Women were also more likely than men to list multiple career possibilities when they reported their goals.

The early research focus on gender differences masked the differences in career aspirations between women (and between men) in the valedictorian group. In the fifth year of the study, therefore, analyses concentrated on the career-related differences among the study women. Two distinct vocational groups emerged among the female high academic achievers. Discriminant function analyses showed that women who aspired to high vocational levels were separated from less professionally ambitious women by work and family values, rather than by ability, family background, and college quality (Arnold, 1987). Valedictorian women's job values, mother's education, planned timing of marriage and childbearing, and job experience effectively indicated their 1986 professional level. These variables separated the two female vocational groups very accurately.

In contrast to the findings on women, male study members are separated now by ability, by early work experience, and by the desire for prestigious careers. As compared with lower achieving men, high career achievers attended more selective colleges, have higher intellectual self-esteem, are more highly motivated to master tasks, and feel more optimistic about reaching their goals.

The eight Black and Hispanic study members reported a variety of obstacles to their continued educational and career achievement. This group has a disproportionate number of students who did not finish college and the average length to the bachelors degree is higher for minority than for Anglo valedictorians. Economic difficulties, family situations, and cultural expectations affected the minority students' awareness and use of educational opportunities. Once enrolled in predominantly white institutions, Black and Hispanic students reported experiences of marginality, racism, sexism, and lack of faculty support.

Current Status of Study Group: 1991

Twenty-six women and sixteen men in the study are currently married or engaged to be married. The married or engaged valedictorians are 56% of the women and 46% of the men. One man and one woman study member are divorced. Nine female valedictorians have children or are currently expecting a child (20%). Nine men are parents (22%), including one salutatorian who has adopted his wife's three half-siblings.

The valedictorians now work and study around the country, although the group is centered in the midwest and in the greater Chicago area. Approximately forty percent of the group currently lives in Chicago, with another forty percent in downstate Illinois and neighboring midwestern states. Nineteen study members have settled outside the midwest, although half of this 'mobile' group lives as temporary residents pursuing their own or their spouse's graduate study or military service.

The percentage of men and women in graduate school was relatively similar in 1988, with twenty percent of each group pursuing graduate degrees. By 1991, fifty percent of the female valedictorians had either completed graduate degrees or were actively engaged in graduate study (Table 1). Thirty-seven percent of the male study members have received graduate degrees or are current graduate students. Only one minority valedictorian has

completed a graduate degree, a Black engineer who received an MBA. Four women and one man began graduate programs but are no longer active students.

Despite the higher percentage of female graduate degree holders, the valedictorians' graduate fields still show gender differences. Men have entered law school in greater numbers. Women outnumber men in medical school. Male Ph.D. students are studying math, science, and engineering. In addition to these fields, women Project members are studying humanities, agriculture, and education. Ten women have completed terminal Master's degrees or are enrolled in terminal Master's programs. In sharp contrast, only three men completed terminal master's degree programs.

Male and female study members are participating in the male dominated professions of science, math, business, engineering, and law (Table 2). Reflecting their college majors, 70% of the group are employed in science, math, engineering, and business careers. Six students are attorneys, four are physicians, three teachers, and six women are nurses or physical therapists. Three women with pre-school aged children are currently homeworkers, and ten study members are employed in nonprofessional jobs such as clerical positions. Finally, valedictorians are employed in church work, farming, architecture, broadcasting, and art design.

Although many female valedictorians are pursuing male-dominated career fields, the study group generally reflects the sex segregation of occupations found in the labor force. Women only are employed in female-dominated jobs of precollege teaching, nursing, physical therapy, and secretarial work. No men are currently working in female-dominated professions, although two male valedictorians are currently beginning second undergraduate degrees in teacher training. The two men who completed undergraduate education degrees are both working in business. Three quarters of the study men are working in business and technical fields. Women are far more likely than men to be employed in nonprofessional positions that in some cases do not require a college degree. And only women are currently working full time in childraising and homemaking. These women remain very interested in professional achievement, however. All of the women outside the labor force intend to return at some point to paid employment outside the home.

Table 1
Educational Attainment of Former Valedictorians: 1991

Highest degree earned by 1991	female #	%	male #	%	total %	%
No undergraduate degree	3	.07	3	.08	6	.07
Undergrad. only	17	.37	18	.52	35	.44
Left graduate study	4	.09	1	.03	5	.06
Masters (MA/MS)	7	.15	2	.06	9	.11
Masters Bus. (MBA)	3	.07	1	.03	4	.05
Law degree (JD)	1	.02	5	.14	6	.07
Med. degree (MD)	3	.07	1	.03	4	.05
Ph.D.	8	.16	4	.11	12	.15
TOTAL	46	100%	35	100%	81	1005

Table 2
Current Occupations of Former Valedictorians: 1991

Occupation	females #	males %	total #	%
Businessperson/ Accountant	7	12	19	.23
Clerical worker/ Retail sales	7	2	9	.11
Engineer/ Computer science	7	8	15	.18
Not employed outside home	3	0	3	.04
Lawyer	1	5	6	.08
Ph.D. Scientist/ Mathematician*	5	3	8	.10
Physical therapist/ nurse	6	0	6	.08
Physician	3	1	4	.04
Pre-college teacher	3	0	3	.04
Other**	4	4	8	.10
TOTAL	46	35	81	100%

*Includes Ph.D. chemist working in science writing

** Women: religious studies student; church worker; retail display designer; exercise instructor Men: farmer, undergraduate student, architect, commercial video maker

The valedictorian group is generally very physically and psychologically healthy. Like any group of this size, however, they have struggled with a variety of life difficulties. In addition to the two divorced students, a half dozen other study members have experienced marital difficulties of varying severity and duration. Four students have lost both parents in the past decade and three study members have been involved in serious automobile accidents. A group of students has experienced significant instances of depression, including two former valedictorians who dropped out of graduate school. The other nine students who dropped out of undergraduate and graduate school faced significant obstacles to their continued educational achievement. Two single women in the study had unplanned pregnancies. Several participants have experienced difficulties with substance abuse, including one valedictorian who has been hospitalized for alcoholism. Temporary unemployment, illness, financial hardship, and stress have all affected men and women in the valedictorian group through the last decade.

Case studies

The early career levels of the 46 female valedictorians in the Illinois Valedictorian Project are far more varied than those of the male study members, even though women were as successful as men in college academics. The purpose of the current investigation is the understanding of the process by which gifted women and minority students translate academic achievement into adult vocational achievement. Group data give an overall profile of the educational early career patterns of academically talented women and men. Interview data trace the stories of individual valedictorians over the decade following high school, giving additional insight into the role of values, attitudes, and tacit knowledge in the formation of career aspirations.

Three individuals cases are briefly profiled here* . The cases of two women demonstrate the undergraduate experiences of former valedictorians that have led in the first instance to extremely high early career attainment and in the second to a decision to defer career involvement. The third case profiles an African-American man who attended an historically Black institution after dropping out of a predominantly white urban university. The profiled students have been chosen to represent diverse personal and academic backgrounds. Although they are distinct individuals, none is unique in the study. These cases, in other words, closely resemble stories that could be told about other valedictorians in the study. Names and other identifying features have been omitted but as few details as possible have been changed. The narrative is often in the valedictorians' own words; all quotations are verbatim responses from typescripts of tape-recorded interviews.

Sherri

Sherri grew up in a small industrial city in Illinois. She graduated salutatorian in her class of 180 at a Catholic high school. (The valedictorian, interestingly, entered the local community college after graduation, dropped out and has never reentered higher education.) Sherri's parents had not attended college; her mother had completed high school, her father had not. Sherri's father worked as an electrician and her mother was employed part time in an elementary school as a cafeteria worker. Sherri's home was not one with a lot of books or discussion of science or world events. She says her parents were behind her high achievement, though, placing great value on working hard and doing your best. By the first grade, Sherri already knew she was a top student. She read

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* Versions of these cases have appeared in earlier speeches and reports on the Illinois Valedictorian Project.

independently and did well in all her classes, but she always enjoyed math and science classes the most. "High school came easily for me, it really did. I worked. I was socially active. I went to sports events. I never really gave up anything that I can think of."

In high school, Sherri had a teacher for physics and chemistry who was trained as a chemical engineer. He encouraged Sherri to consider medical applications in physics. He also urged her to attend the engineering open house at the state research university. Sherri was impressed by the nuclear engineering exhibits and the people she met at the open house. She told interviewers: "So I guess I applied in nuclear engineering more or less on a whim." Sherri found that college was not as effortless as high school. After receiving a 'D' in her first semester of college calculus, she changed her study habits and became more serious about her classes.

Her first two years of college, Sherri was unsure whether she wanted to remain in engineering. She considered law school. Her sophomore year, Sherri got to know some graduate students and professors. "I'm in nuclear engineering and I'm just now getting into my field. I've been talking with people that are in graduate school now. People that have gone out to work and come back. Even professors."

Sherri's adviser recommended a class in bioengineering her sophomore year for which Sherri lacked the prerequisite. When Sherri expressed strong doubts about her preparation, her adviser insisted she could handle the course and accompanied her to the professor of the class to ask his permission to take it without the background course. The professor agreed, providing Sherri would keep in touch with him during the semester. She not only did well in the class, she became well acquainted with that faculty member. At this point, Sherri still didn't know if she wanted physics or engineering, work or graduate school. She still talked about possibly entering law school. Her sophomore year, she had the following to say about her career:

> Maybe I won't even like the field when I get there. I really don't know. Maybe I won't want to cope with it after I get done, maybe I'll want to say 'forget it, I want a family.' Stay home. Throw it all away. I don't know. At this point I hope not because I really enjoy what I'm doing right now. But I don't really know what the industry's going to be like at all. So I guess right now, ideally, I'd want to work because I think I would be unhappy if I didn't have that stimulation. So maybe I could have something I could do at home...

The professor whose course she had taken recommended Sherri for a research assistantship in a lab. Sherri took the job, but she had a lot of doubts about her ability. She said: "When I was approached for the job it took a lot of convincing. I didn't want it. I was afraid this professor was assuming my physics background is a lot better than it is." In the lab, Sherri found that she was able to do the work. She got to know more graduate students and faculty in nuclear engineering. She started being known around the department as the "medical engineering" person. She began spending time socially with graduate students. That summer, following her junior year, Sherri followed a professor's recommendation and took a summer job at a national laboratory in the midwest.

Again, Sherri initially doubted her ability. She told interviewers:

> At first I was mortified. I just couldn't believe what they expected me to do in eleven weeks. It was two new computer systems and I hadn't done any programming since my sophomore year, but I think it was probably the best experience I ever had because now I know I can do it. Throw something at me. I'll live through it and work it out.

The summer job helped Sherri believe she was exceptionally competent-- something people around her had been telling her for the past three years. The job also allowed her to see herself in a high level position. Sherri said: "It wasn't what I expected it to be. It was on one level. I mean, there are fantastic people up there doing fantastic work. But they are people and they have a lot of good times and they are not gods or anything. I think wherever I end up, I'd be OK." She returned to this idea later in the interview: "I thought there were a lot of people who knew everything about everything. This *is* a national lab, these people *are* Ph.D.'s. And they are just people. And they make mistakes."

Her senior year of college, Sherri was offered a research project in radiation technology in a hospital. She was now considering which Ph.D. program would be best in her speciality, and spoke knowledgeably about the work of potential research supervisors around the country. In the interview that year, Sherri responded to the quotation read to her from two years before in which she had said she might give up a career for a family.

> At this point the career comes first. Last spring I did a lot of things with graduate students. That and my [national lab] job have probably strengthened my conviction. There really was never any pressure put on in high school. It just happened more or less. Now I see that there is potential and I think it's silly to waste it, so I want to be good what I'm doing.

As a college senior, Sherri said she didn't care about what other people think of her or what her peers are doing. She said she would deal with marriage and family decisions as they come up. The ultimate for her, she said, was "always being challenged. I can never perceive myself as being in a situation where I would stop learning."

Sherri began her Ph.D. in nuclear engineering at a prominent research university on the east coast. She moved to another elite research institution to follow a research mentor when her interests began shifting to more biologically based medical radiation techniques and methodologies. After "teaching myself undergraduate biology," Sherri is currently finishing her dissertation in Cancer Radiobiology and has accepted a prestigious post-doctoral appointment. Her professional self-confidence and knowledge of career management in her field are considerable. She still does not think she has extended herself to her full potential. "My mother says that if I am doing this well without working that hard, it would be amazing what I'm really capable of." And Sherri still has some ambivalence about the dedication required of a scientist. "I have always had a social life. I refuse to give that up." Sherri plans to marry and have children, a goal she sees as compatible with continued career involvement.

Sherri is among the most successful study women in terms of her early career. Her current achievements are based on belief in her ability, fascination with her subject, and work and research experiences in her field. Sherri arrived in college with a vague interest in medicine and physics and with a strong background in math and science. Recognition from others,

interaction with practicing scientists, and involvement in undergraduate research all strengthened her commitment, identity, and tacit knowledge as a scientist.

Ellen

Ellen graduated as valedictorian in a class of 300 at a public suburban Chicago high school. The only Jewish student in the study, Ellen comes from a highly educated family. Her father, grandfather, and older brother are all attorneys. Her mother is an elementary school teacher.

Ellen is a multi-talented woman who was extremely active in high school varsity basketball and softball, as well as playing clarinet in the school band and writing for the newspaper. She was president of the National Honor Society at her high school and a member of the Spanish Club. Ellen credits her parents for her strong values for education, success, and hard work. Her brother, a top student, was also an influence, particularly in her choice of an east coast Ivy League college.

The first time Ellen spoke with interviewers was her freshman year of college. She stated repeatedly that being valedictorian was her reward for hard work. Ellen didn't view herself as "inherently smart," but claimed that "being smart doesn't get you anywhere. It's being smart and putting it to work."

In fact, Ellen had serious doubts about her ability. Her biggest fear had always been that she lacked the intelligence to be a lawyer. She planned to study political science, but was unsure about a government or law career. Through her freshman year at college, Ellen struggled with "a feeling of total lack of self-worth and feeling like I was the stupidest person in the world." She described herself as "unhappy and uptight" because she wanted to do everything perfectly. "I don't want to do anything if I'm not going to be the best at it." Ellen has always been her own most severe critic, describing herself as "anxious, self-conscious, and a worrier."

From the first interview, Ellen spoke of the future in terms of both work and family. She would work as a married women, she said, "not to show men that girls can do it too, but because I just have the desire in me to work." Ellen was uncertain of her career path and put pressure on herself by fearing that her actions would limit future possibilities.

> I started thinking that since I don't know what I want to be when I grow up, I'd better not close any doors for myself now. I had to do everything perfectly so that when it came time when I had decided what I wanted to be, I'd be able to do it. I wasn't really able to enjoy school.

Ellen pledged a sorority her second year in order to form more friendships. By her junior year in college, Ellen had spent a summer in Spain and a summer at a law firm. These experiences made her more comfortable with her career indecision. She planned a government internship in Washington, D.C. for the second semester of her junior year, but was still fighting her insecurity about her abilities. Ellen's goal for the summer in Spain had been to achieve fluency in Spanish. Since the program's participants were all Americans, she did not become fluent. Her summer as a secretary in a law firm was to decide whether she should go to law school after graduation. By summer's end, she was still undecided.

> I put so much emphasis on being fluent in Spanish so that I could say that's my one redeeming quality. I failed there. Then I though, 'OK, I'm going to be a lawyer and that's my redeeming quality.' But then I felt, 'I don't think I'm qualified,' so I failed there. I went to Spain, I worked at a law firm, and now I'm going to go to Washington, three great things, it's like two strikes and now I'm going to try for the third. If I fail here, then I'm really out. I'm not going to make anything of my life.

Ellen said she knew such worries were extreme and unproductive. She was beginning to feel more positive about the Washington experience, she claimed. The government internship was, in fact, a qualified success. Ellen did not resolve her career indecision, however, nor did she find a professional model or mentor. The significant event of this year was the increasing seriousness of Ellen's relationship with her boyfriend of three years and their engagement that summer. Ellen explained her vision of the 'ultimate' her junior year: "The ultimate for me would be to be married, to have children and to be a mother, but not only a housewife-- a housewife and a good mother as well as a working woman."

By senior year, Ellen planned marriage right after graduation. Her fiance was beginning medical school in the midwest. Ellen followed him there, seeking "any job you can get with a liberal arts degree." She initially found work as a management trainee in a bank, but left to enter a Masters program in public policy. She also worked at a prestigious job in academic publishing. Ellen had her first child as she completed her Masters degree and a second after moving with her husband to the east coast for his medical residency. Although she planned to find work when the family moved, Ellen has chosen not to work outside the home. "I am an extremely conscientious mother. I feel I need to bring these children up and that I can't do it part time." Ellen types student papers and sells cosmetics out of her home. She is considering a third child and has no plans to enter the labor force until her youngest child enters elementary school.

Ellen is "happier than ever before" as a mother and home-based typist and salesperson. She still experiences conflict between family and vocational achievement, however, and continues to doubt her abilities as she fails to achieve her own high standards. At this point, Ellen has chosen to emphasize marriage over career. There is, however, little doubt that both are very important to her. Ellen herself can neither predict her likely career path, nor see herself as a high achieving professional.

Eric

Eric graduated salutatorian of an inner city Chicago high school with a predominantly minority student body. Forty percent of his freshmen classmates had dropped out of school by Eric's graduation. Only one of Eric's six brothers and sisters completed high school. This brother attended a proprietary business school but was chronically unemployed by the time Eric was a teenager. "I always looked to him, but since he's been lagging, there's not really anything I can look towards, anyone else. I believe if I were to graduate from a university I'd be the only one in my entire family and extended family also that has done that."

Perhaps Eric's unique position in the family originated in the time he lived with a grandmother or maybe it had more to do with an early, enduring love of reading. Eric also

points to the influence of "elementary school teachers, I can remember them. Some of the things that they would tell me. To keep working. To keep working." Eric's family was not simply lacking educational role models. He described his home atmosphere as an "uproar," saying that in his large family "there was always so much noise and distraction and I've always been the only one that really sat down and studied." He developed very young the ability to detach himself from noise and confusion and to concentrate deeply on what he was reading.

> Sometimes I get surprised to this day--I look back and see some of those things that I accomplished in high school. At the time I believe there were 5-6 of us children in the house. I believe that during high school I probably was one of the most underprivileged students, I mean as far as the finances. No one really knew it because I would go out and work after school at times just to make a little money to pay, to help get to school. To have money to have lunch fare, to have bus fare, to help with the struggle, to get to school. And just to work, just to do my work, that really was a struggle. Could never really understood what I was trying to do or why I was trying to do it. But, I know, I was just fortunate--I've always considered myself blessed with the ability to keep trying if nothing else failed, just to keep trying, never give up.

Eric began college in the fall term following his graduation as high school salutatorian. In retrospect, he sees that he limited his educational options when he chose the local city university.

> I really blew it coming out of high school. I didn't apply to enough colleges because money-- just my understanding and coming from my family-- I probably blew a lot of scholarships and things that I probably could have received given my ranking and my overall activities at school. I possibly could have gotten a full scholarship somewhere if I had applied for it.

The structure of the university required Eric to begin his studies in a general liberal arts division and then transfer into his desired curriculum of engineering through a competitive process. Eric found himself in a series of courses that were unrelated to his areas of interest. He developed no relationships with faculty and, as a commuting student, was uninvolved in campus life. Worst of all, family problems had affected Eric's academic performance and he found himself ineligible to enter engineering. Eric dropped out of college and was out of touch with the valedictorian study for several years. (The valedictorian of Eric's class, another Black male, dropped out of college for some of the same reasons. He has never resumed undergraduate study.) Family problems were at the core of Eric's disappointing start in college.

> I never really got a sensing there at the University, never really got my feet on the ground as far as studies. Seems like ever since high school, my family was always getting up and moving. Seemed like every 2-3 months. Family problems such as no one to pay the bills, that's one of the reasons why I chose to stay in the area at first, to try to help out my family with bills... I just thought there was the

> obligation. A personal thing. The family was so close, had a lot of younger brothers and sisters, trying to help them as I went along... And after a while I just sat back and promised myself that Eric, what you're doing is really hurting yourself more than helping the family to go along. You're still not doing well in school; the family's going to survive whether I'm there or not. And that's what happened. I decided to go.

Eric transferred to an historically Black college in another state. He chose the college because a high school administrator was an alumnus who was always "singing the [school] fight song in the hallways." Eric entered a coop engineering program that requires students to alternate semesters of full time study and full time engineering employment. Eric's college experience was transformed by his new environment. For the first time, he became involved in campus life and activities. "I got a start in what I considered college life, getting comfortable in school."

Unlike his experience at the city university, Eric received consistent support from his faculty at the historically Black college. Even though his first year grades were adversely affected by continuing family difficulties, Eric said he received: "a lot of respect from my instructors because they knew how good a student I was or how good a student I could be." His instructors told Eric he would be able to complete the normal 5 year program in 4 years if he worked diligently to master the fundamental concepts in the beginning courses. Eric followed this advice and became more and more involved in his academic work as he entered more challenging courses. Unlike his previous school, where he was barred from courses in his desired major, Eric was able to begin the engineering curriculum immediately, "doing something I always wanted to do." When a top engineering classmate asked Eric for academic assistance, Eric said he felt a new identity as an engineer and a renewed confidence in his academic talent.

Proximity to his family, especially through an illness of his mother, motivated Eric to choose coop placements and a post-graduate position in his home city. He and his girlfriend of several years married before his graduation, which occurred nine years after leaving high school. Eric works as a mechanical engineer and is active in volunteer service in the Black community. Immediately following graduation, he and his new wife adopted her three young half-siblings.

The contrast between Eric's experience at his first institution and his second is overwhelming. The environment at the historically Black college provided him with social and community involvement and a feeling of mattering. Most importantly, the encouragement and recognition of the faculty, the presence of a coop program for financial support and job experience, and the opportunity for meaningful achievement was in stark contrast to Eric's initial experience of higher education.

Sherri, Ellen, and Eric

Traditional conceptions of socioeconomic status and, indeed, the quantitative findings of the male group in the Illinois Valedictorian Project would predict that Ellen would work at a higher level career than Sherri. Ellen came from a professional home with college educated parents and siblings; Sherri did not. Ellen grew up in an affluent Chicago suburb and attended an Ivy League college; Sherri lived in a small industrial city and attended a public university. Ellen and Sherri had equally high ACT scores and college grades. Ellen's study habits were stronger than Sherri's. Clearly, Ellen's unrealistically low intellectual self-

esteem, her lack of tacit knowledge about how to plan and implement a career among multiple possibilities, and her values for early marriage and child raising restricted her early career achievement. Sherri was equally unsure about the relationship between future family and career roles when she began college. She was unable to envision herself working in the career path of her academic major and displayed low intellectual self-esteem when faced with new challenges. Unlike Ellen, however, Sherri received the support and undergraduate experiences she needed to develop an identity as a scientist and to build a sophisticated array of tacit knowledge about building a career in a male-dominated science field.

Finally, Eric experienced an unsupportive college experience in his first, predominantly white university. Family and financial difficulties compounded Eric's poor start in higher education. In the historically Black institution, however, Eric's experience closely resembled that of Sherri, with supportive faculty, testing professional experiences, and a social and professional reference group.

Tacit knowledge

Women and minority valedictorians consistently revealed their lack of tacit knowledge about how to build their careers. Their identity as career achievers was more diffuse than their white male peers. Women and minorities were constrained in the development of career identity by their inability to see themselves in high level career settings, and by their lack of support and models.

Clarity and commitment to achievement goals rests largely on one's ability to see oneself in those roles. Women can see themselves as good students-- they are already experienced at academic achievement and their supporters are often female teachers. And women can imagine themselves doing more of the same in college-- continuing to be top performers. It is in imagining their career ends that women have difficulty. Not only do they have difficulty imagining exactly how career and family will be combined but vocational ends themselves are unclear. Two women with extremely high college grades articulated the difference between career and academic identity:

> Going to graduate school scares me to death. Because, I mean, I like math but I'm not, like, a Mathematician.

> I just really can't see myself as a research chemist. None of my friends are chemists. I consider myself an academic chemist. I've always done well in my chemistry classes. But to actually go into a lab and they say, 'OK, run this reaction,' I have no clue. So, in that context, I really can't see myself... Maybe I'm just playing at being a scientist.

This last quotation is from a Ph.D. chemistry student the summer before her graduate school entrance. This student had neither science-related out-of-class experiences nor a professional reference group. She recently finished her Ph.D. and decided to leave chemistry before going on to the post-doctoral stage.

Academically talented minority students also have difficulty in imagining themselves in high level careers. One study member, a Black woman, left law school after the first year, finding it too difficult to work full time and be a law student. She had never discussed her work plans with anyone, nor had she considered the option of funding her first year of law

study through loans. This valedictorian enjoys singing, and thought she might like to become an entertainment lawyer. The law school she attended was not one of the few in the country which prepares entertainment lawyers, however, and she had only a vague idea of what the specialty entailed or how to implement a career in entertainment law. She knew no practicing lawyers in any specialty.

A major reason many women and minorities find it difficult to develop the base of untaught practical knowledge for envisioning, planning, and implementing high level careers is a lack of support, mentorship, and significant interaction with faculty. The most successful women in the valedictorian study were unusual in receiving special opportunities and attention from faculty. Most of the study women and minorities did not become close to any faculty person. Several asked the researchers to write letters of recommendation because they said no faculty person knew them well.

Marguerite, an Hispanic engineering graduate, discusses tacit knowledge about colleges and careers in terms of economic advantages.

> I was talking to somebody the other day. She was talking about picking up her daughter to begin a trip in which they were going to visit colleges and universities so that they could make a good choice for her. Her daughter is being prepared for college by going to a college prep school away from home. Now, that's something that I didn't have and very few minority students have-- certainly students who come from financially impoverished backgrounds never had. Also, I never had a parent who could give me advice on college choices or on professional matters. I never had role models that I could look at and talk with about such matters as college.

Another Hispanic woman told interviewers: "I can't find any support. Like if I could see that somebody is interested in me or somebody is concerned about how I'm doing. I'm really trying hard and I see no motivation coming from anywhere." An African-American valedictorian who dropped out of college after his sophomore year was asked who had influenced him:

> My life has taken so many turns. At any given time it might have been anybody. Early on, I had a lot of influence from my sisters. I probably had some negative influence from my brother. I don't know, career wise, no one who has been a mainstay. People have been in and out, in and out.

A female education major discussed leaving the top science science and math track in high school:

> I'm not exactly sure why I dropped out of the honors math program. Part of it was my own fault. But I wished someone had counseled me to really stick it out. I think I would have liked a little more encouragement. For someone to say: 'you can do it, Pam.' My counselors seemed to accept it as perfectly natural that I would drop out of the math program and not take advanced biology. I think if I'd

> have taken advanced biology in high school I would have realized how interesting I'd find it.

A minority woman was dropped from the honors program in high school "But I don't know, see, the computer got mixed up or something, and the second year they didn't put me in, and I didn't complain to them. I didn't take any more honors courses."

An Hispanic study member provides what is perhaps the most vivid example in the Illinois Valedictorian Project of the consequences of poor tacit knowledge. A full time worker and mother of an infant son, this valedictorian dropped out of college with only one semester remaining before graduation. She describes how she approached a college counselor to arrange a part time schedule for her remaining 12 credits.

> I couldn't understand. I mean, I want to go back and graduate there, it's a very good school. And I asked [tne counselor] to explain it to me and the way she explained it to me, she said you're better off taking 6 credits. If not, you're going to lose credits. And I did not understand it. And I came home and I was depressed... It didn't make any sense to me. Is that the way they do it? That's why I haven't gone back.

Implications for education

Outstanding academic achievement does not automatically translate into high level career aspirations for academically gifted women and minorities. Tacit knowledge about managing educational and career paths can affect the eventual achievement of high school valedictorians even before they enter college. Minority and first generation college students, for instance, often limit their college search and, like Eric, may overlook scholarship opportunities.

Top math and science students sometimes find themselves locked into an inflexible curriculum without having explored alternative majors. Since many engineering, science, and business majors require a commitment in the freshman year, high school instructors, advisers, and career professionals can be crucial in helping students become aware of academic options and their consequences.

The minority and first generation valedictorians might have lacked sophisticated tacit knowledge about college and major choice before beginning undergraduate study. The study group reported extremely positive secondary school experiences and relationships with high school teachers, however. They all benefitted from guidance and encouragement from teachers and, of course, experienced public recognition from the entire high school and often from the wider community. The equally high levels of intellectual self-esteem reported by female and male valedictorians as high school seniors attest to their personal identity as high achievers.

Higher education, in contrast, often failed to provide necessary tacit knowledge for high performing female and minority students. The valedictorian study group earned high grades as undergraduates because they were bright, motivated, hard working, and persistent. A major task of higher education is the transition of the locus of achievement identity from that of school attainment to that of adult career performance. It is precisely this transition that caused great difficulty for the female, Black, and Hispanic gifted students.

The inability to imagine high level career achievement is often a gap in the tacit knowledge of top women and minority students. Even high achievers cannot realistically aspire to what they cannot imagine. The valedictorian study demonstrates that practical knowledge regarding careers can result from undergraduate research experiences and professional work related to the college major. Case studies reveal that such testing experiences provide an antidote to unrealistically low self-estimates of ability, allow students to envision themselves as high achieving adults, and give gifted individuals the beginning of an achievement identity as an adult professional rather than a scholastic performer.

Equally important for intellectual self-esteem and the development of career choices and identity is recognition and support of students by faculty. As Sherri's case demonstrates, faculty support must be active, making students aware of opportunities and sometimes vigorously advocating, even pushing students to take advantage of special opportunities. Faculty should not assume that their best female and minority students know how to choose a specialty, locate a research sponsor, or select a graduate program. Nor should faculty assume that exceptional students are familiar with practices of specific fields. The Black student who left law school, for instance, was unaware of the connection between first year grades, *Law Review* election, and career opportunities.

As the stories of Sherri and Eric illustrate, social and work interaction with a professional reference group that includes undergraduate and graduate students as well as faculty can be an important component of socialization into a discipline. Peers, advanced students, and faculty can advance the accumulation of sophisticated knowledge about professional development for talented students. Professional reference groups also appear to strengthen a student's personal and public identity as a 'scientist' or 'engineer' or 'artist,' a necessary step in the transformation of students into adult achievers.

Ellen's case documents the presence of an extra "stage" in the career planning of college women. Unlike men, women must decide what emphasis to place on career within multiple life roles. Hazy notions of how to combine career and child raising affect college major and vocational choices of academically talented women as early as sophomore year of college. Female valedictorians make potentially life-defining choices as undergraduates without practical knowledge of the realistic demands of high level careers, without models of how to manage career and family involvement, and without being able to envision the career component of their adult lives. Postsecondary curricula and even women faculty rarely address the issue of career planning in the context of multiple role expectations.

Given the difficulty of acquiring tacit career knowledge for the study women and minorities, these talented students are eager for guidance and open to even casual advice. Eric, for instance, chose a college for transfer because his high school counselor used to sing the fight song in the halls. An Hispanic study member stayed in college an extra semester because a job recruiter said it would be helpful to add a computer science major to her engineering degree. A female agriculture student entered graduate school when a professor asked casually what masters degree programs she was considering.These life course changes came about through limited, casual encounters.

Several implications for higher education follow from these valedictorian stories. First, even top students lack tacit knowledge about managing careers. Mastering subject matter and earning academic distinction is insufficient for guaranteeing the translation of academic achievement into career attainment. Second, the power of career management advice and encouragement, particularly from faculty, is great. Third, the transmission of tacit knowledge doesn't always require formal or elaborate mentoring arrangements.

Environments that foster interactions between faculty and students, provide opportunities for the formation of peer and graduate student reference groups, and facilitate active involvement in collaborative research lead naturally to the acquisition of practical understandings and tacit knowledge. Finally, students not only lack tacit understanding about their careers, they are often unaware of the existence and importance of such practical knowledge about their fields. Higher education administrators and faculty need to consider how to make students aware of the existence and importance of tacit knowledge and provide guidance about where and how students can learn the untaught curriculum.

Conclusion

Len, the valedictorian who wondered aloud where all the academically talented women had gone, was a third generation Ivy League graduate with high achieving parents. His speculation about women's careers not only reveals the indirect link between academic achievement and careers for women but also demonstrates his own experience in which grades translate directly into career ambition and attainment.

> My theory is, I guess, that they [women] were expected to, or no one minded for them to do very well in high school, in terms of grades in high school math and things like that, but that didn't immediately, directly translate into career ambition. Whereas for me, one just seems like a perfectly logical outgrowth of the other. You do your best in a high school class and you get an 'A.' You do your best in a college class and you get an 'A,' you get admitted to law school and you do your best and you get an 'A' and then, based on that you get a job as a law clerk and you work very hard and do a good job in that and make a reputation for yourself and it all kind of naturally follows. I assume that it must be the case for some people that the fact that you got an 'A' in Miss Coppersmith's English class really bears no connection to how ambitious you are for yourself in your career.

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